**Name:** _____ **Class:** _____ **Date:** _____ **ID: A**

# MATH 171, Exam 3 Review

**Multiple Choice**
*Identify the choice that best completes the statement or answers the question.*

____ 1. Find the intercepts and asymptotes of the rational function $r(x) = \dfrac{9x + 108}{-4x + 12}$.

a. $x$-int. $y$-int. horiz. asymptote vert. asymptote
(0, −12) (9, 0) $y = -2.25$ $x = 3$

b. $x$-int. $y$-int. horiz. asymptote vert. asymptote
(−12, 0) (0, 9) $y = -2.25$ $x = 3$

c. $x$-int. $y$-int. horiz. asymptote vert. asymptote
(−12, 0) (0, 9) $y = 3$ $x = -2.25$

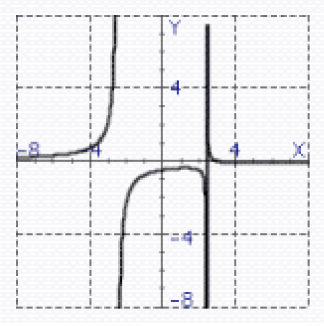
d. $x$-int. $y$-int. horiz. asymptote vert. asymptote
(−12, 0) (0, 9) $y = 4$ $x = -2.25$

e. $x$-int. $y$-int. horiz. asymptote vert. asymptote
(−12, 0) (0, 9) $y = 9$ $x = -9$

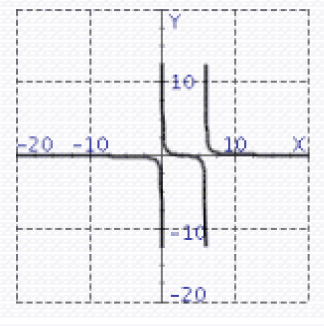
**Name:** _____ **ID: A**

____ 2. Determine the correct graph of the rational function $r(x) = \dfrac{x - 3}{x^2 - 6x}$.

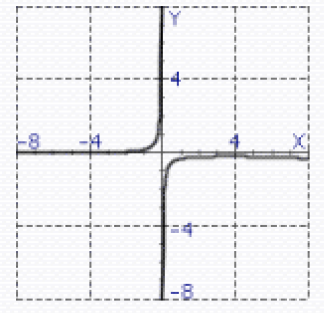
a.



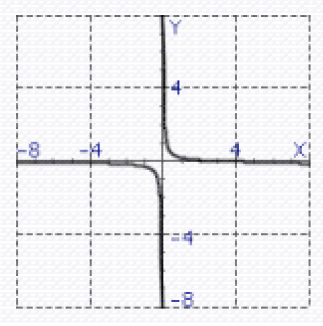

b.



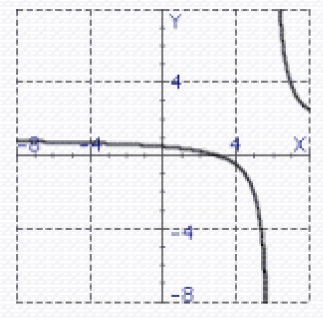

c.




d.

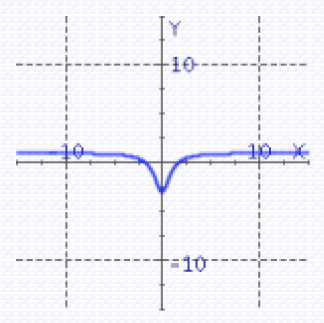



e.

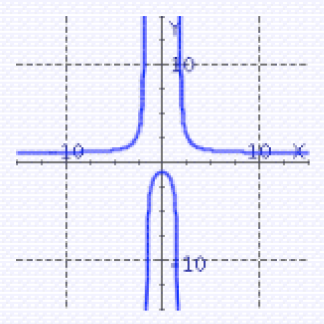


____ 3. Determine the correct graph of the rational function $r(x) = \dfrac{6x^2 + 8}{x^2 - 3x - 9}$.

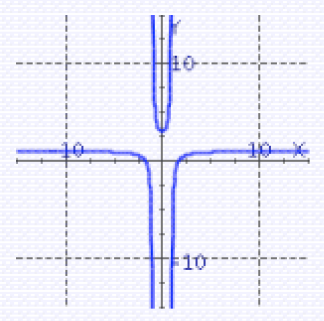
a.



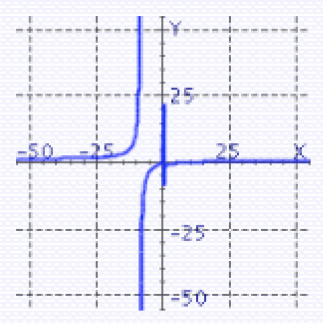

b.



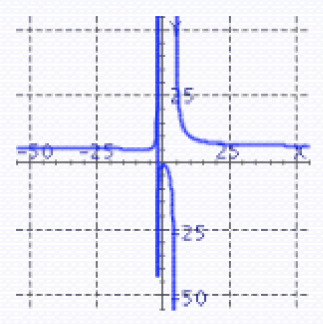

c.




d.




e.




____ 4. Find the slant asymptote of the function $y = \dfrac{x^2 + 8x + 19}{x + 3}$.

a. $y = x - 3$
b. $y = x + 7$
c. $y = x + 6$
d. $y = x - 5$
e. $y = x + 5$

____ 5. Determine the correct points of local minimum and local maximum for the function

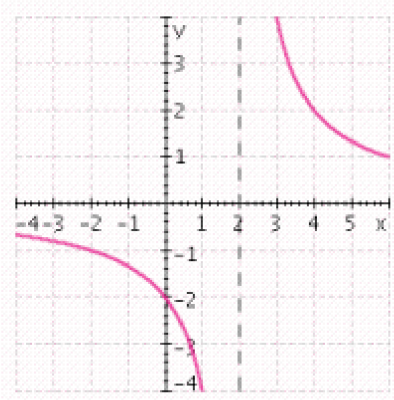
$$y = \frac{x^2 + 13x + 43}{x + 6}.$$

a. local maximum $(-5, 3)$, local minimum $(-7, -1)$
b. local maximum $(0, -1)$, local minimum $(-5, 12)$
c. local maximum $(5, -3)$, local minimum $(7, 1)$
d. local maximum $(-7, 10)$, local minimum $(4, 3)$
e. local maximum $(-7, -1)$, local minimum $(-5, 3)$

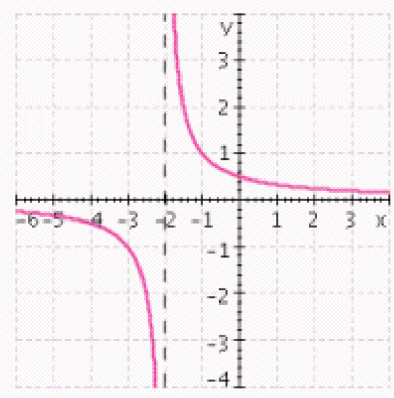
____ 6. Use transformations of the graph of $y = \frac{1}{x}$ to graph the rational function.

$$r(x) = \frac{1}{x - 2}$$

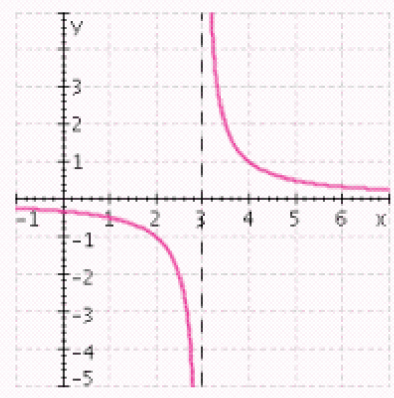
a.



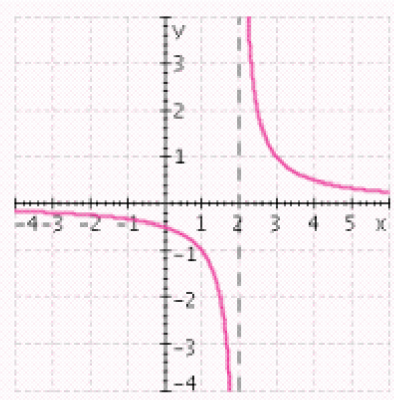

b.



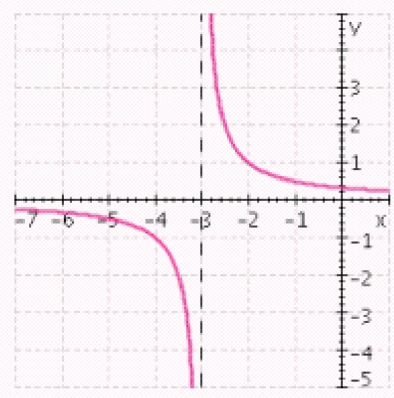

c.




d.

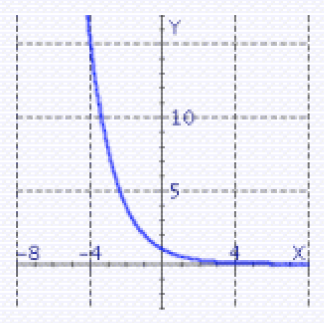



e.

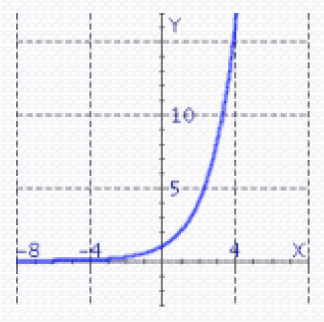


____ 7. Identify the graph of the function $f(x) = \left(\frac{1}{2}\right)^x$.

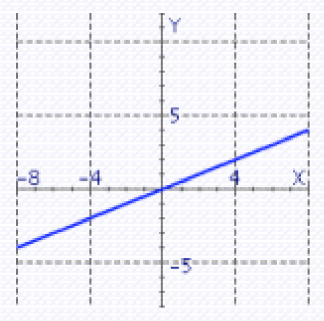
a.



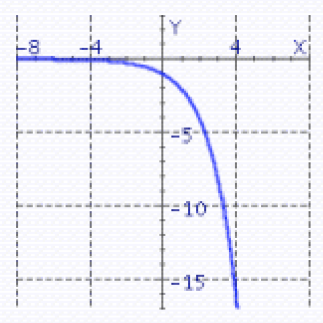

b.



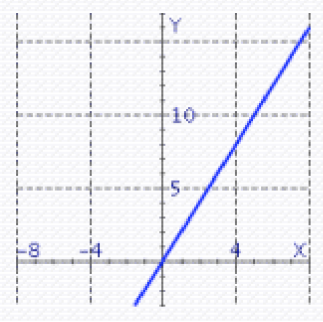

c.



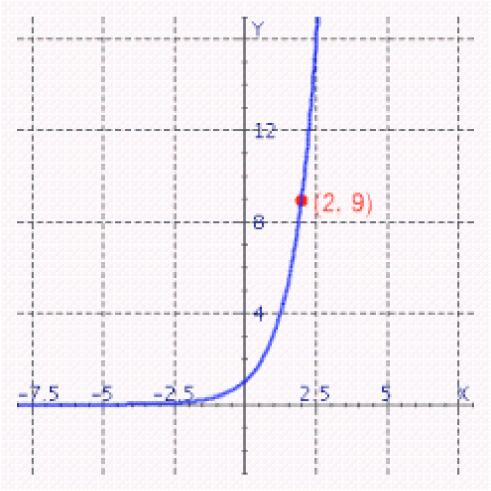

d.




e.



____ 8. Find the exponential function $f(x) = a^x$ whose graph is given.




a. $f(x) = 3^{-x}$
b. $f(x) = -3^x$
c. $f(x) = 3^x$
d. $f(x) = x^3$
e. $f(x) = 3^{x+3}$

____ 9. Determine the domain and range of the function.

$h(x) = 2 - 5^x$

a. Domain: $(-5, \infty)$; Range: $(2, \infty)$
b. Domain: $(-5, 5)$; Range: $(-2, 2)$
c. Domain: $(-\infty, 2)$; Range: $(-\infty, \infty)$
d. Domain: $(-\infty, \infty)$; Range: $(-\infty, 0)$
e. Domain: $(-\infty, \infty)$; Range: $(-\infty, 2)$

____ 10. The population of a certain species of bird is limited by the type of habitat required for nesting. The population behaves according to the *logistic growth model*

$$n(t) = \frac{2{,}310}{0.7 + 26.2e^{-0.433t}}$$

where $t$ is measured in years. What size does the population approach as time goes on?

a. 3,300 birds
b. 2,310 birds
c. 9,900 birds
d. 6,600 birds
e. 1,617 birds

____ 11. If $7,000 is invested at an interest rate of 6% per year, compounded monthly, find the amount of the investment at the end of 2 years.

a. $7,879
b. $7,890
c. $7,432
d. $7,893
e. $7,865

____ 12. A sum of $2,000 is invested at an interest rate of 10% per year, compounded semiannually. After how many years will this investment amount to $3,592?

a. 6 years
b. 8 years
c. 5 years
d. 7 years
e. 9 years

____ 13. Express the equation in exponential form.

$\log_4 16 = 2$

a. $2^{16} = 4$
b. $2^4 = 16$
c. $4^2 = 16$
d. $16^2 = 4$
e. none of these

____ 14. Express the equation in logarithmic form.

$4^{y} = n$

a. $\log_{y} 4 = n$
b. $\log_{n} y = 4$
c. $\log_{4} y = n$
d. $\log_{4} n = y$
e. none of these

____ 15. Evaluate the expression.

$\log_{4} 64$

a. 64
b. 16
c. 3
d. 4
e. none of these

____ 16. Use the definition of the logarithmic function to find $x$:

$\log_{4} x = 3$

a. $x = 12$
b. $x = 4$
c. $x = 81$
d. $x = 64$
e. none of these

____ 17. Use the definition of the logarithmic function to find $x$.

$\log_{x} 32 = 5$

a. $x = 5$
b. $x = 2$
c. $x = 4$
d. $x = 32$
e. none of these

____ 18. Use the Laws of Logarithms to rewrite the expression below in a form with no logarithm of a product, quotient, or power.

$\log_2(x(x-7))$

a. $\log_2 x - \log_2 (x-7)$
b. $\log_2 x + \log_2 x - 7$
c. $\log_2 x + \log_2 (x-7)$
d. $\log_2 x^2 - 7x$
e. $2\log_2 x - \log_2 7$

____ 19. Use the Laws of Logarithms to rewrite the expression below in a form with no logarithm of a product, quotient, or power.

$\log_6\left(\frac{x}{5}\right)$

a. $\log_6 x + \log_6 5$
b. $\frac{\log_6 x}{5}$
c. $(\log_6 x)(\log_6 5)$
d. $\frac{\log_6 x}{\log_6 5}$
e. $\log_6 x - \log_6 5$

____ 20. Use the Laws of Logarithms to rewrite the expression below in a form with no logarithm of a product, quotient, or power.

$\log_a\left(\frac{x^8}{yz^7}\right)$

a. $\frac{8\log_a x}{\log_a (7y)\log_a z}$
b. $-8\log_a x + \log_a y + 7\log_a z$
c. $8\log_a x - \log_a y + 7\log_a z$
d. $8\log_a x + \log_a y + 7\log_a z$
e. $8\log_a x - \log_a y - 7\log_a z$

____ 21. Evaluate the expression.

$\log_4 2{,}304 - \log_4 9$.

a. $\log_4 2{,}295$
b. 9
c. $\ln 2{,}304$
d. 4
e. 36

____ 22. Rewrite the expression as a single logarithm.

$\log_7 3 + 3 \log_7 2$

a. 1
b. $\log_7 6$
c. $\ln 24$
d. $\log_7 24$
e. $\log_{24} 7$

____ 23. Use the Change of Base Formula and a calculator to evaluate the logarithm, correct to six decimal places. Use either natural or common logarithms.

$\log_3 19$

a. 3.690144
b. 2.679744
c. 3.216173
d. 2.680144
e. 0.373114

____ 24. Simplify.

$(\log_3 5)(\log_5 13)$

a. $\log_3 18$
b. $\log_3 13$
c. $\frac{3}{13}$
d. $\log_{13} 3$
e. $\frac{1}{5}$

____ 25. Find the solution of the exponential equation.

$3^x = 13$

a. $x = 0.4283$
b. $x = 0.2308$
c. $x = 4.3333$
d. $x = 0.2318$
e. $x = 2.3347$

____ 26. Find the solution of the exponential equation.

$13^x = 5^{x+3}$

a. $x = 5.0543$
b. $x = 1.5937$
c. $x = 5.0531$
d. $x = 0.5937$
e. none of these

____ 27. Solve the equation.

$x^7 4^x - 4^x = 0$

a. $x = 1$
b. $x = 4$
c. $x = -7$
d. $x = 7$
e. none of these

____ 28. Solve the logarithmic equation for $x$.

$\log x = -4$

a. $x = 10{,}000$
b. $x = 0.0001$
c. $x = 0.00005$
d. $x = 0.00001$
e. $x = 0.6021$

____ 29. For what value of $x$ is the following true?

$\log (x + 9) = \log x + \log 9$

a. $x = 10$
b. $x = 1.125$
c. $x = 0.051$
d. $x = -7.875$
e. $x = 4.5$

____ 30. A man invests $5,000 in an account that pays 7% interest per year, compounded quarterly. Find the amount after 7 years.

a. $8,127.06
b. $5,645.61
c. $33,244.19
d. $8,028.91
e. none of these

____ 31. The number of bacteria in a culture is modeled by the function

$n(t) = 400e^{0.25t}$

where $t$ is measured in hours. What is the initial number of bacteria?

a. 0 bacteria
b. 1 bacteria
c. 25 bacteria
d. 800 bacteria
e. 400 bacteria

____ 32. A culture starts with 8,400 bacteria. After one hour the count is 11,000. Find a function that models the number of bacteria $n(t)$ after $t$ hours.

a. $n(t) = 11{,}000e^{0.30t}$
b. $n(t) = 8{,}400e^{0.30t}$
c. $n(t) = 8{,}400e^{0.33t}$
d. $n(t) = 8{,}400e^{0.27t}$
e. $n(t) = 11{,}000e^{0.27t}$

____ 33. An unknown substance has a hydrogen ion concentration of

$[H^+] = 5.9 \times 10^{-5}$ M

Find the pH.

a. pH = 9.7
b. pH = 5.0
c. pH = 12.0
d. pH = 4.2
e. none of these

____ 34. If one earthquake is 18 times as intense as another, how much larger is its magnitude on the Richter scale?

a. 1.56 larger on the Richter scale
b. 2.19 larger on the Richter scale
c. 1.96 larger on the Richter scale
d. 1.26 larger on the Richter scale
e. 2.89 larger on the Richter scale

# MATH 171, Exam 3 Review
# Answer Section

## MULTIPLE CHOICE

| | | | | |
|---|---|---|---|---|
| 1. | ANS: B | PTS: 1 | MSC: | srca.04.05.30m |
| 2. | ANS: B | PTS: 1 | MSC: | srca.04.05.40m |
| 3. | ANS: E | PTS: 1 | MSC: | srca.04.05.49m |
| 4. | ANS: E | PTS: 1 | MSC: | srca.04.05.57m |
| 5. | ANS: E | PTS: 1 | MSC: | srca.04.05.65m |
| 6. | ANS: D | PTS: 1 | MSC: | srca.04.05.21m |
| 7. | ANS: A | PTS: 1 | MSC: | srca.05.01.03m |
| 8. | ANS: C | PTS: 1 | MSC: | srca.05.01.09m |
| 9. | ANS: E | PTS: 1 | MSC: | srca.05.01.24m |
| 10. | ANS: A | PTS: 1 | MSC: | srca.05.01.64m |
| 11. | ANS: B | PTS: 1 | MSC: | srca.05.01.69m |
| 12. | ANS: A | PTS: 1 | MSC: | srca.05.01.74m |
| 13. | ANS: C | PTS: 1 | MSC: | srca.05.02.01m |
| 14. | ANS: D | PTS: 1 | MSC: | srca.05.02.10m |
| 15. | ANS: C | PTS: 1 | MSC: | srca.05.02.14m |
| 16. | ANS: D | PTS: 1 | MSC: | srca.05.02.23m |
| 17. | ANS: B | PTS: 1 | MSC: | srca.05.02.29m |
| 18. | ANS: C | PTS: 1 | MSC: | srca.05.03.15m |
| 19. | ANS: E | PTS: 1 | MSC: | srca.05.03.16m |
| 20. | ANS: E | PTS: 1 | MSC: | srca.05.03.24m |
| 21. | ANS: D | PTS: 1 | MSC: | srca.05.03.05m |
| 22. | ANS: D | PTS: 1 | MSC: | srca.05.03.39m |
| 23. | ANS: D | PTS: 1 | MSC: | srca.05.03.49m |
| 24. | ANS: B | PTS: 1 | MSC: | srca.05.03.60m |
| 25. | ANS: E | PTS: 1 | MSC: | srca.05.04.01m |
| 26. | ANS: C | PTS: 1 | MSC: | srca.05.04.19m |
| 27. | ANS: A | PTS: 1 | MSC: | srca.05.04.27m |
| 28. | ANS: B | PTS: 1 | MSC: | srca.05.04.37m |
| 29. | ANS: B | PTS: 1 | MSC: | srca.05.04.51m |
| 30. | ANS: A | PTS: 1 | MSC: | srca.05.04.67m |
| 31. | ANS: E | PTS: 1 | MSC: | srca.05.05.01m |
| 32. | ANS: D | PTS: 1 | MSC: | srca.05.05.09m |
| 33. | ANS: D | PTS: 1 | MSC: | srca.05.05.28m |
| 34. | ANS: D | PTS: 1 | MSC: | srca.05.05.33m |